Issue of Halalan Toyyiba in Food Supply Chain among Food Handlers

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ABSTRACT

In the Halalan Toyyiba food supply chain, the polls regarding contamination often occur involving prohibited elements or elements that endanger human health and safety. According to the World Health Organization (WHO), various cases of contamination and food poisoning have been reported worldwide which have resulted in poor health conditions and endangering human lives. Typically, diarrhoea is the most widely reported illness. It causes 550 million people to fall ill and 230,000 deaths annually. In Malaysia, there are also reported cases of contamination and food poisoning. It involves food contamination in school canteens, wedding caterings, and dining outlets. The cases have shown that there was a neglect on the aspects of halalan toyyiba in the food supply chain among food handlers. In Islam, the negligence of taking halalan toyyiba food affect both physical and spiritual aspects of individual. Hence, this study adopted qualitative method by using library research where literature and cases related to food contamination in Malaysia from press reports and the Ministry of Health data has been refered to. Researchers also interviewed 11 informants involved in food handling around the Klang Valley. The study showed that neglecting halalan toyyiba food handling practices (HTFHP) in the food supply chain lead to halal and toyyib-aspect contamination from the farm to the table such as external raw food contamination, contamination caused by cleaning processes, food packaging contamination, food storage

contamination, contamination during food transport, and contamination during food storage. Therefore, there is a need for an awareness on food handling among food operators to ensure that food handling is practiced in accordance with HTFHP, and it protects consumer from eating foods containing prohibited and harmful substances.

Keywords: *Halal Ecosystem, Food Safety, Food Supply Chain, Consumer Protection, Halalan Toyyiba Food Handling Practice (HTFHP)*

INTRODUCTION

In the food processing industry, a food handler's role is crucial in insuring the halalness, cleanliness, and safety of the food (A.Thaivalappil et al., 2018; S. Barjaktarovic-Labovic, 2018) or whether it fulfills the halalan toyyiba aspect from the farm to the table (Mohd Anuar & Mohammad Aizat, 2016). These aspects of the pilgrimage were also recorded in the Quran (al-Maidah 5:4, al-A'raf 7:157, al-Baqarah 2:168, al-Mu'minun 23: 51, al-Nahl 16: 114). It has been found that incorrect practice in the food industry by food handlers are responsible for about 97% of foodborne ailments and killing an estimated 1.9 million people annually at worldwide (Khan, 2018). The biggest risk is diarrhoea which recorded 582 million cases globally in a year whereby about 700,000 out of them were children who died under the age of five years old (Djalma Chave, 2018). Examples of food handling mistakes from farms to the table involved improper cooking procedures, misuse of storage temperatures, lack of sanitation and sanitation by food operators, and cross contamination between raw materials and ready-to-cook foods (Khan, 2018: Saidatul Afzan & Hayati, 2013; Nieto-Montenegro, Brown & Labarde 2008). Studies showed that 70% of food poisoning cases were caused by food handlers themselves (Wilson et al., 1997) whereby almost 39% of them were from their fingers through cross contamination (Ryan et al., 1996). This contaminant can occur if fingers that are in contact with food surfaces are not properly cleaned (Bas, Ersun & Kıvanc, 2006; Lues & Tonder, 2007). Additionally, other sources of contamination are from food sources, equipment used, and preparation sites (Mohd Anuar & Alina Masri, 2010). This is also driven by the lack of attention towards halalan tayyiba food control supply chain (De Andrade et al., 2019). For example, there are many food handlers who sell kosher food, but their premises, shops, or

stalls are dirty. Their dishes, food processing spaces, stores, and environment are unclean and repulsive (Abdul-Mutalib et al., 2015). This situation is in fact contrary to the aspects of *halal* and *toyyib* in Islamic teachings. Hence, negligence in food handling supply chain of *halal* food can cause a major impact to the food's status and consumer's safety which can lead to a risk of death. In this regard, this study examines the importance of food handling supply chain amongst food handlers in applying the practice of halalan toyyiba of food handling practice (HTFHP) as a guide to the handlers.

LITERATURE REVIEW

Halalan Toyyiba Food Supply Chain

In general, the integrity of halalan toyyiba food is dependent on the supply chain by food handlers involved in the production of food from the farm to the table (Omar et al., 2012). Generally, it includes several stages: selection and preparation of raw materials, processing, heating, packaging, storage, transportation, and logistics to consumers (Zainuddina & Shariff, 2016). For Muslims, the aspect of halalan toyyiba in food supply chain is important to avoid forbidden and impermissible things in Islam as well as contamination and food poisoning. Thus, to ensure the food handling is halalan tayyiba, the food handlers need to adhere to the practice of HTFHP as a complete and valid guide. This is in line with the words of Allah:

> Meaning: "O ye who believe! Eat of the clean and pure that We have provided for you, and be grateful to Allah, if it is Him ye worship".
>
> (Surah al-Baqarah: 172)

Halal means a product that can be eaten and allowed in Islamic law (Muhammad Rida, 1959: Lewis Ma'luf al-Yasu'I, 1908: Sa'id Abu Jayyib, 1998: Ibrahim Anas et al., 1985). While toyyib refers to clean, pure, and in compliance with Shariah (Jawad Alzeer et al., 2018: Muhammad al-Tahir ibn 'Ashur, 1984). Therefore, food that is only halal is simply inadequate, food handlers also need to understand and apply the meaning of tayyiban in food provision.

In this HTFHP guide, the essential aspect to be aware is preparation of raw materials from halal and *toyyib* sources. Knowledge of halal sources include permitted and prohibited raw materials in Islam, raw materials containing prohibited elements, and harmful raw materials to consumers (Khafidz Hamzah, 2016: Musfirah Syahida et al., 2015: Muhammad Ikhlas et al., 2013). Examples of prohibited sources are pigs and its derivatives, abusive slaughtering plants, banned plants, and harmful herbs (Syed Ghazali, 2014). Furthermore, *toyyib* sources include aspects of purity, hygiene, freshness, nutrition, and the safety of raw material sources provided to consumers (Khan, 2018).

In addition, halal and *toyyib* sources should also be observed in the processing stage and during serving. For example, halal food should be free from contact with prohibited or unclean parts or objects along the food handling supply chain. Among the aspect that should be aware of are the washing methods such as to use flowing water to wash vegetables, fish, and meat. From the aspect of food handlers, it is necessary to have a healthy worker who practises personal hygiene (Knight & Kotschever, 1998; Jamal Khair, 2008; Willis et al., 2012; Mass Catering Guidelines, 2016). Likewise, in terms of equipment used, it is necessary to ensure its cleanliness before and after use especially containers used to serve food for consumers (Aishah Hamzah, 2002). Furthermore, the premises should also prioritise on hygiene care to ensure that they are free from impurities and faecal matter.

Therefore, the measurement of halalan toyyiba food begins from the preparation process to the table and the practice of the food handlers. If the food handling supply chain is well-kept, the food can be considered as a pillar of halalan toyyiba. Furthermore, it is free from contamination in terms of halal and *toyyib* aspects. From the halal aspect, contamination can lead to societal restrictions among consumers and affect consumers' spirituality while contamination from the toyyib aspect can invite the presence of various pathogens, chemicals, and harmful substances which affects the physical health and safety of consumers (Mohd Farhan et al., 2018). Halalan toyyiba food handler's practice of HTFHP is a basic guide to prevent prohibited elements, poisoning, and food contamination.

Critical Issues Regarding Negligence of Halalan Toyyiba Food Handling Practice (HTFHP) in Food Supply Chain

The neglecting of halalan toyyiba in food handling practices (HTFHP) among food handlers will result in food poisoning caused by food contamination. With the desire to gain profits in the food business, most of food handlers are negligent towards halalan toyyiba food handling practice (Saadan Man & Zainal Abidin, 2014, MBPJ, 2015). This will lead to consumers taking food that might contains bacteria that could produce toxins and interfere human digestive system, or more seriously, involve a case of death (Cristina Nerin et al., 2016). Food contamination can occur in various situations along the process of food handling supply chain from the farm to the table. Among them are:

1. External raw food contamination.

   Contamination of external raw material is due to various factors whether it involves the contamination of prohibited materials such as pork DNA and its derivatives, blood and carcasses in raw material sources (Muhamad Afiq & Mohd Anuar, 2018), or the use of chemicals such as insecticides, fungicides, fertilisers, drug residues, and antibiotics in unauthorised plants, preservatives, or usage which exceeded permitted limits. For example, poisoning caused by Loh Si Fan or Mee Tikus has killed at least 13 people on 15 October 1989 in Kampar, Teluk Intan, Tanjung Tualang, and Batu Gajah, Perak (KKM, 2018). These incidents were due to the negligence of producers who used preservatives or boric acid which was not permitted (Nokumala, 2018). Usage of chemicals can endanger the health of consumers which exhibit symptoms of diarrhoea and vomiting. For the long-term effects it may result in defects or cancer. In addition, the use of antibiotics in agriculture and livestock breeding without proper quality control is also a part of contamination of raw materials (Mstar, 2017). These residues can be harmful to humans if taken in large amounts. Several methods have been developed for determining antibiotic residues in foodstuffs such as meat, eggs (Donkor et al., 2011), or milk (Koenen-Dierick et al., 1995; Freitas et al., 2014). A case reported by CAP (Consumers Association of Penang) in May until June 2006 found that the usage of Salbutamol in beef, goats, and pigs had been increased.

This can lead to insomnia, chills, fatigue, nervousness, and aggravation of heart conditions (Nokumala, 2018). At the same time, the usage of fertilisers and pesticides in fruits and vegetables (Kobayashi et al., 2011) also has its side effects on human health (Chung et al., 2011). For example, vegetables planted in Johor and Cameron Highland estate farms used high amounts of pesticides such as poisons for palm oil (NST, 2007). It was used to ensure that the vegetables look fresh, but if used continuously, it can cause cancer, liver disease, nerve damage, and birth defects. There were also reports of recycled vegetables sold in the market. The vegetables and fruits were cleaned and resold to entrepreneurs' restaurant (Mstar, 2017). Thus, based on HTFHP, as food handlers, they need to be carefully selecting raw materials and ensure that the raw materials are in a clean and non-smelly state. Harmful bacterial infections such as salmonella, e. coli, and campylobacter found in meat, poultry, and fish can lead to food poisoning and ultimately harm consumers. Food handlers must wash their hands perfectly after handling raw materials to minimise risk and avoid cross-contamination on cooked food. Similarly, raw materials from plants such as fruits and vegetables that are contaminated with animal faeces should be washed with clean water before being cooked or eaten to ensure cleanliness.

2. Contamination during food transport and logistics of raw material

Food contamination can occurres during transportation. The contamination can be caused from vehicle exhausts of petrol and diesel or due to cross contamination in the vehicle used for food transportation. Cross contamination can create a serious risk for food safety. In 1999, a major illness in the European Economic Community was attributed to fungicide-contaminated pallets used for transportation and storage of food packaging materials (Nerín et al., 2007). Cross contamination also involves the mixing of halal and prohibited materials in the same container and warehousing (BH Online, 2017). Unfortunately, the use of transportation does not distinguish between halal and prohibited materials. It is done through the change of halal and prohibited materials by the transport service provider without the cleaning process.

3. Contamination during food processes

For food processing stages, contamination from prohibited aspects usually occurs due to the mixing of prohibited ingredients in cooking such as alcohol/wine and adding animal's blood (Mohammad Aizat et al., 2014). Additionally, contamination can also occur from chemicals such as cleaning agents or disinfectants. This level of contamination occurs when the manufacturer does not properly conduct food processing such as using chemicals that are not suitable for the fruits and vegetables or the chemicals used are not approved by the law and are harmful for consumers. For example, carbon monoxide compounds such as dodecyl trimethyl-ammonium chloride and non-ionic surfactants such as ethyl alcohol and stearyl alcohol are used. These chemicals need to be eliminated by considering flushing or water temperature factors (Helmschrott & Wildbrett, 1985). In addition, the presence of foreign entities also often occurs at this stage such as needles, cockroaches, cockroach eggs, lizards, rubber, hair, rubber caterpillar, and so on. There was a recent frog incident found in fried rice at UiTM Shah Alam which sparked various responses among the cafe operators (FMT, 2019). As a security measure to avoid contamination at this stage, the United States FDA (US Food and Drug Administration) has produced a formula for efficient and environmentally safe cleaning and disinfecting agents (Naegeli & Kuepper, 2006). In addition, computer-based image processing techniques have been used to determine which processed foods are of good quality and are healthy to eat. Among the techniques employed is the Camera Charge Couple Device (CCD) function to assess the quality of fish, fruits, cereals, meat, and vegetables. Ultrasound is used to determine the fat content of meat, estimate the yield, and determine the quality and grade of the meat. Magnetic Resonance Imaging (MRI) is used to assess the quality of food transported from one place to another. Computed Tomography (CT) is used to give a true picture of what is in the foodstuff. The ECT (Electrical Capacitnace Tomography) technique was developed to determine the number of fruits allowed to enter the container (Norkumala, 2018). This is the best alternative whereby the quality and food safety are assured and to achieve halalan tayyiba processing standards.

4. Contamination Due to Heating Process

The process of heating food posed a risk of biological contamination because processed food requires high temperature to cook. In addition, combination with external factors can lead to the formation of toxin compounds which can have a deleterious effect on the food quality and safety. Certain toxic compounds (acrylamide, nitrosamines chloropropanols, furanes, and PAHs) can be formed in food during the process of heating, baking, roasting, grilling, canning, hydrolysis, or fermentation. Frying is a cooking process that can produce a wide variety of toxic compounds in food. It is a dehydration process in which oil acts as the medium for heat transfer. Oxidation process in frying oil is inhibited by the food through protein, starch, or phenolic compounds. Oxidation products are bounded to protein and other components of the substrate. Flavour substances are produced by the reactions of oxidised frying oil with protein and other sulfur and nitrogen substances in the food. Various compounds are released from the food into the frying oil which enhances discolouration or off-flavors. Pigments present in the frying oil may also be adsorbed on the surface of fried foods. This will cause undesirable effects on the body and can lead to cancer if used repeatedly (KKM, 2018). In addition, microwave heating is becoming an increasingly used method for heating foodstuffs in home and in some industrial sectors. A common method of microwave cooking is that the food is cooked in the packaging material (wrapping film, container) and placed in the microwave oven. Such microwavable packaging materials include plastics, paperboard, and composites which during microwave cooking, many of their components can migrate from the package and into the food. This will result in a decrease of food quality and food safety (Nerin et al., 2002; Ehlert et al., 2008).

5. Contamination during Food Packaging

Food packaging provides many advantages such as physical protection and barrier protection which allows better food preservation that will increase the shelf life of the product. However, food contamination issues often occur at this stage through the manufacture of food packaging. Typically, chemical contamination in different additives

during the manufacture of food packaging such as antioxidants, stabilisers, slipping agents, or plasticisers are among others that are commonly added to polymers to improve the material's properties. The direct or indirect contact between the food and the packaging material can cause transference of these substances from the packaging to the food in a process called migration (Catala & Gavara, 2002). Migrants can pose a health risk for consumers if they have a toxic effect. To protect consumers, there is a strict legislation in FDA, Europe, Mercosur, Australia, and Eurasia as well as in many other countries to avoid contamination from the materials and articles to the food in contact with them. This applies to any article, either at consumer or at industrial level. In Europe, food packaging materials must comply with the framework Regulation (EC) No 1935/2004 on materials and articles intended to come into contact with food (Europe an-Commission, 2004) and with Regulation (EC) No 2023/2006 on good manufacturing practice (European-Commission, 2006). In Malaysia, the body that controls food packaging is the Food Safety and Quality Division. Glass is another common material used in packaging marmalades, jams, vegetables, beans, or sauces. In this case, migration comes from the metallic lids used for closing the glass jars. These lids usually have a PVC gasket to ensure the seal is good and tight. Epoxidase soybean oil (ESBO) is one of the additives used as plasticiser in PVC and its migration to food has been reported by several authors (Pedersen et al., 2008). Additionally, paper-packed food packaging also creates a risk of food contamination when printed inks are removed. Sanches-Silva's study found that migration can occur from the packaging ink to the food (Sanches-Silva et al., 2009; Mohd Hamdan, 1985). Plastic is a food packaging material under the chemical category. Containers and wrapping materials made from palms are usually designed for specific uses and should not be misused. For example, styrene is a substance used in the manufacture of polystyrene and is a carcinogenic agent that causes cancer. Bisphenol A is a chemical used in the manufacture of polycarbonate. Its use can cause disruption of the hormone system as well as interfere with the body's functioning system. Furthermore, phthalate chemicals are additives mixed in plastic manufacturing to enhance its flexibility which affects the human reproductive system. Thus, as a safety measure, instructions should be followed when using plastic containers for filling or wrapping food to avoid chemical migration from plastic to food.

6. Contamination during food storage

Food storage conditions are key parameters in food quality and safety. Proper storage extends the shelf life of food depending on the food type, packaging, and storage conditions, particularly temperature and humidity. During storage conditions (high temperature and humidity), the properties of the packaging material can be affected. The phenomena of migration and sorption of external/internal substances (which at the end can be released again from the packaging to the food) can occur anytime. Thus, food storage should be monitored to prevent food contamination. This is because biological contamination can easily occur if the temperature and humidity are not at a suitable level. To minimise contamination, humidity in the storage should be low. Moisture can lead to the breakdown of some packaging materials (paper degradation and metal rusting). The optimum range of temperature storage for dry foods is at room temperature, hot food >63˚C, high risk cold food is 0-4˚C, and cold food <-18˚C (KKM, 2018). Direct sunlight can speed deterioration for both the food and packaging. Adsorption of unwanted off-odours is also a common phenomenon in food storage. High fatty foods are prone to odour contamination.

METHODOLOGY

This study adopts qualitative approach that used to look at the halalan toyyiba food handling practice (HTFHP) among food handlers and its effects on food handling supply chains. This selection of qualitative approach is more appropriate to understand a phenomenon deeply (Strauss & Corbin, 1990) from unclear, unfair, and irrational situations regarding social structures that restrict the development and progress of individuals and communities. This study used two main data collection: primary data and secondary data. Primary data was obtained through interviews (Cummins, 2009: Sherman & Webb, 2001). Meanwhile, secondary data was obtained through content analysis from documents, newspapers, books, articles, and related websites (Creswell, 2013). The interviews conducted were semi-structured (Morrison, Ross & Kemp, 2007) which involved 11 informants consisting of catering handlers, school canteens, restaurants, and cafeteria. In

this study, the researchers focused on questions about how food handling is practiced amongst them and what are the issues that occur along the supply chain of food handling. The informants need to comment on their daily food handling practices starting from raw material procurement, processing, storage, transportation, and serving. As suggested by Hannabuss (1996), recording and transcript are needed for better understanding and analysis. Hence, the researchers used a Philips VTR5100 model as a voice recorder and the transcript was written using Microsoft Word files and attached to the Atlas.ti 8 program for analysis.

RESULT

Table 1 shows the field study conducted for 11 food handlers relating to food handling practices from the farm to the table.

Table 1: Types of Contamination from the Farm to the Table

Types of Contamination		Quantity	Examples of Contamination
Halal	***Toyyib***		
Unclean indirectly	Chemical	3	• use of excessive sweeteners, dyes in cooking as well as the use of floor cleaning during the handling period
Unclean indirectly	Physical	10	• hair, rats, flies, rice fleas, chicken feathers, insects, vegetable caterpillars, cockroaches and nails
Unclean indirectly	Biological	4	• salmonella bacteria in chicken and eggs, food becomes stale, milk becomes sour, and warming the fish at improper temperatures
Unclean indirectly	Allergen	1	• dusty
Unclean directly Unclean indirectly	Cross Contamination	7	• the cooked food and raw materials are mixed, dirty raw material storage, the use of cooking utensils, halal and non-halal items are mixed, cooking and flooring activities at the same time, non-systematic raw material handling and waiver of the handlers' personal cleanliness

Table 1 shows the forms of halal contamination and *toyyib* contamination that have taken place during the field study conducted on 11 informants from the farm to the table. Contamination of *halal* aspects consists of contaminants of unclean directly and unclean indirectly. Meanwhile, the *toyyib* aspect consists of 5 categories which are chemical contaminant, physical contaminant, biological contaminant, allergic contaminant, and cross contamination. For the category of physical contamination, there are a total of 10 items found. Among them were hair, rats, flies, rice fleas, chicken feathers, insects, vegetable caterpillars, cockroaches, and nails. Meanwhile, the frequency of cross contamination is 7 items, namely, the case of mixing cooked food and raw food together, dirty raw material storage, the use of cooking utensils, halal and non-halal items are mixed, cooking and flooring activities at the same time, non-systematic raw material handling, and waiver of the handlers' personal cleanliness. For biological contamination, 4 items were found which are salmonella bacteria in chickens and eggs, food becomes stale, milk becomes sour, and warming the fish at incorrect temperatures. In chemical contamination, 3 items were identified: the use of excessive sweeteners, dyes in cooking as well as the use of floor cleaning during the handling period. Lastly, dusty was identified in the allergen contamination. Based on the field study, food handling supply chain poses a risk of being exposed to various food contaminants whether halal-aspect contamination or *toyyib*-aspect contamination.

DISCUSSION

Reflecting on the various issues that occurred, it is important for food operators to take care of the aspects that had arisen. Therefore, the precise and contemporary understanding of HTFHP is important and should be noted. This is to ensure that the food and drink taken is in accordance with the requirements of Islam which is free from *halal*-aspect contamination and *toyyib*-aspect contamination that is harmful to physical, mental, emotional, and spiritual health (Nurul Asmida & Mohd Anuar, 2018). Every stage poses a risk of *halal*-aspect contamination and *toyyib*-aspect contamination. Table 2 shows the importance of the process of halalan toyyiba food handling practices (HTFHP) from the farm to the table. As discussed earlier, the waiver of HTFHP will result in various issues.

Table 2: Halalan Toyyiba in Food Handling Practice

HTFHP from the Farm to the Table		
HTFHP Process	**Types Of Contamination**	
	***Toyyib* Aspect Contamination**	***Halal* Aspect Contamination**
Production of raw materials (receiving, cleaning, storage, decomposition)	• Cross contamination • Chemical contaminants • Physical contaminants • Allergen contaminants	All processing stages are exposed to *halal*-aspect contamination by illegal containing and unclean element: • The unclean contamination directly • The unclean contamination indirectly
Food processing (cooking, reheating of cooked food)	• Cross contamination • Chemical contaminants • Physical contaminants • Biological contaminants	
Food packaging	• Cross contamination • Chemical contaminants	
Food storage	• Cross contamination • Chemical contaminants • Biological contaminants	
Food transport	• Cross contamination	
Food distribution	• Cross contamination • Biological contaminants • Physical contamination	

Method to prevent contamination in food handling supply chain

a) Protecting food from contamination
- ensure personal hygiene
- purchase raw materials from reliable sources and have a halal certificate
- segregate raw materials & finished goods
- label the raw materials properly
- cover food always
- ensure food & equipment/utensils are off the floor
- building, equipment, vehicles & fixtures maintained
- proper stock rotation- FIFO System (*first in first out*)
- practice proper cleaning and disinfecting procedures
- use clean equipment & utensil
- prevent pest entry to the premise
- well ventilated and adequate lighting
- non-food chemicals separated from food handling areas and are stored in a clean and well- ventilated space.
- choose Shariah-compliant logistics

b) Preventing bacteria grow in the food
- storing food at <5˚C or >60˚C (dry food at room temperature, hot food >60˚C, chilled (high-risk food) 0-4˚C, frozen food <-18˚C)
- storage of food with the dangerous zone for a short time
- dry food
- use preservative
- cook food thoroughly
- processing methods such as pasteurisation, sterilisation, UHT etc

Sources: (Marco Tieman, Jack G.A.J. van der Vorst, Maznah Che Ghazali, 2012. Developed based on Supply Chain Model oleh van der Vorst dan Beulens, 2002: Yusuf al-Qaradawi. Al-Halal wa al-Haram fi al-Islam, 1980: Muhamad Jamaludddin al-Qasimi. Tafsir al-Qasimi Mahasin al-Ta'wil, 1957)

CONCLUSION

In fact, providing food that is a halalan toyyiba is a compulsory in Islam because it involves the risk of life and the safety of consumers. As food handlers, they need to emphasize halalan tayyiba food handling practices to prevent food contamination. Poor attitude and practice in food handling can threaten consumer survival. Therefore, cases of food contamination that arise from day to day need to be addressed by the authorities to ensure the sustainability of the halal industry in general and the food sector in particular.

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